Faculty of Engineering & Technology
Master of Technology (M. Tech)
(W. E. F.: 2023-24)

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Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Master of Technology (M. Tech)
Course Code	:	1MTE04
Course Title	:	Advanced Thermal Power & Nuclear Plant Engineering
Type of Course	:	PE
Year of Introduction	:	2023-24

Prerequisite	:	Basics about Boiler
Course Objective	:	To learn about how the power is generated in a power plant and its applications
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Explain the layout, construction and working of the components of thermal, Diesel, Gas and Combined cycle power plants
	CO2	Explain the layout, construction and working of the components of Nuclear power plants
	CO3	Explain the layout, construction and working of the components of Renewable Energy power plants
	CO4	Explain the applications of power plants while extending their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
03	00	02	04	70	30	30	20	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage
1	Introduction: Types of Power plant, thermal & nuclear power plants in India, comparison of thermal & nuclear power plants, Layout of thermal & nuclear power plants, recent developments in power generation.	5	5%
2	Steam power plant:	15	30%

	Main elements and working of steam power plant, thermodynamic analysis of simple Rankine cycle, performance enhancement methods; regeneration (up to 3-stages), reheat, thermal analysis of steam condenser & cooling tower, recent development and advancement in steam power plant engineering, maintenance as well as safety measure of components of steam power plant.		
3	Gas turbine power plant: Elements of gas turbine power plant, thermal analysis of simple gas turbine power plant, performance enhancement methods; intercooling, reheat & regeneration, cogeneration, combined cycle power plant, waste heat recovery systems, maintenance as well as safety measure of components of gas turbine power plant, the concept of fluidized bed combustion and recent developments.	10	25%
4	Nuclear power plant: Nuclear reaction, Nuclear Reactor, Classifications, Types of reactors, Site Selection, Method of enriching uranium, Nuclear Power Plant Safety, Bi-Product of nuclear power generation, Nuclear power plant in India, three stage program, Future of nuclear power.	10	25%
5	Power plant instrumentations: Pressure measuring instruments, Temperature measurement and Flow Measurement, pollution types, methods of control, factors affecting the economics, loading factors, utilization factor, performance and operating characteristics of power plant.	8	15%

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	To study of modern steam power plant.	02
2	To Study about the Various Types of Fuel & Ash Handling Systems.	02
3	To study about different types of dust collectors and pulverized fuel burners.	02
4	To study about gas power plant.	02
5	To study of different types of steam turbines.	02
6	To study about different types of condensers and cooling towers.	02
7	Testing of diesel fired water tube boiler based steam power plant.	02
8	To study about nuclear power plant.	02
9	To study of different types of steam turbines.	02
10	To study about different types of condensers	02

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Demonstration models of steam power plant and its auxiliaries
2	Gas turbine power plant and its auxiliaries, wind turbine power plant and its auxiliaries
3	Nuclear power plant and its auxiliaries, solar power plant and its auxiliaries, etc.

Suggested Learning Websites

Sr. No.	Name of Website
1	https://nptel.ac.in

Reference Books

Sr. No.	Name of Reference Books
1	Power Plant Engineering, P.K. Nag, McGraw-Hill Education
2	Power Plant Technology, M.M. El-Wakil, McGraw-Hill Education
3	Thermal Engineering, R.K.Rajput, Laxmi Publication
4	Gas Turbines by V.Ganeshan, McGraw Hill Education